RADAR IMAGING AND TOPOGRAPHY OF ARES /MAJA VALLES, ISIDIS, AND TRITONIS LACUS PATHFINDER LANDING SITES;

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The] 995 Mars Opposition provided coverage of sub-Earth latitudes between 16° N. and **22° N. - a** range of latitudes not covered by **3.5-cm** radar during any previous Mars' closest approach. Fortuitously the Mars Pathfinder potential landing sites are constrained (by solar power, aerobraking, and communications engineering considerations) to be in Chryse Planitia, Isidis Planitia, and Amazonis Planitia, in areas which were sampled at high resolution during this opposition. The preliminary prime landing site at the mouth of Ares Vallis in southeastern Chryse Planitia in particular was available at closest approach when the. radar returns were strongest. The 100 x 200 km Ares Vallis landing ellipse covers an area that been rejected as a Viking Lander site in 1976, in part due to Goldstone CW radar echoes with low signal-to-noise (SNR). The Goldstone radar system at 3.5-cm is now 12 dB more sensitive than the 13-cm system in use at the time of the Viking landing site assessment, and thus definitive results on the potential problems of this site have been obtained.

We present updated and integrated evaluations for landing hazards and radar imaging **at the** Ares Vallis site based on two types of radar observations: radar delay-Doppler profiles (ranging for short) and Continuous Wave (CW) radar spectra. Radar observations also cover Maja Vallis, Marte Vallis, Cerberus, and Isidis. The observations are summarized in **Table 1** below. The "ranging" data are in the form of delay-Doppler profiles which fall along a "great circle" on Mars which are nearly lines of constant latitude. The Doppler frequency resolution provides a longitude resolution of about 4 km, while the delay resolution implies a latitude resolution of about 100 km. Three quantities can be extracted from the multiple views of the pieces of the profiles: topography, reflectivity, and Hagfor's C parameter (a measure of rms slope). The delay-Doppler data is fitted using the Hagfors scattering law to extract topography, reflectivity and the Hagfors C-parameter simultaneously. The signal-to noise of the radar system only permits delay-Doppler profile.s in the. opposite sense of polarization from that transmitted. For CW observations, echoes are recorded simultaneously in both the same sense of circular polarization as transmitted (the SC sense) and the opposite (OC) sense. The helicity of circular polarization is reversed upon reflection from a surface that is smooth on all scales within about an order of magnitude of the wavelength, but SC echo power can arise from single backscattering from a rough surface, from multiple scattering, or from subsurface refraction. The circular polarization ratio is thus a measure of near-surface complexity, or "roughness," at scales near the 3.5-cm observing wavelength.

Date	Latitude (deg.)	Longitude (deg.) Begin	Longitude (deg.) End	Locations at high snr	Type
1/27	19.95	36.2	76.2	Chryse, Kase	R
1/29	19.77	322.9	48.7	Ares and Tiu	R
1/30	19.67	321.2	39.9	Ares and Tiu	R
2/08	18.83	216.2	325.6	Tritonis, Isidis	R
2/19	17.89	105.5	207.4	Amazonis	R
3/20	16.85	267.5	336.7	Isidis	R
4/17	18. "/0	318.0	41.0	Arabia, Chryse	CW

TABLE I: Dates and locations of radar tracks on Mars discussed